DOCUMENT RESUME

ED 229 612 CE 035 966

AUTHOR	Semple, Robert M.; West, David B.
TITLE	Cost Analysis of Curriculum Programs. A Technical Report. Occupational Education Research Project Final Report.
INSTITUTION	Nash Technical Coll., Rocky Mount, NC.
SPONS AGENCY	North Carolina State Dept. of Community Colleges, Raleigh. Occupational Education Research Services.
PUB DATE	Dec 82
NOTE	75p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Budgeting; *Cost Effectiveness; *Cost Estimates; *Curriculum Evaluation; Educational Finance; *Models; Postsecondary Education; *Program Costs; Program Development; Program Implementation; Two Year Colleges; *Vocational Education
IDENTIFIERS	North Carolina

ABSTRACT

A research project was undertaken to design, develop, implement, and test a model to examine and evaluate curriculum programs on a cost efficiency basis. The researchers used existing information and the computerized data management system at Nash Technical College in Rocky Mount, North Carolina, to evaluate the cost effectiveness of each instructional center. By combining class section list data and curriculum-direct cost of instruction data, an earnback or efficiency ratio for each curriculum cost center was calculated. During the study, three different methods of calculating program costs and membership hours were compared. Of the three methods tested, researchers recommended the adoption of the method whereby instructional costs for a course are assigned to a curriculum program based upon the intent of the course and whereby all membership hours earned by a course are assigned to the curriculum program responsible for teaching the course. The designers of the project developed a detailed model for implementing such a cost analysis. Outlined in the model are specific activities to be completed by a school's instructional information system, business office, and office of the dean of curriculum programs. The model also prescribes specific procedures to be followed during the cost analysis project's preparation, operational, annual budget planning, and evaluation phases. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED229612

Occupational Education Research Project Final Report

COST ANALYSIS OF CURRICULUM PROGRAMS

A Technical Report

Robert M. Semple
David B. West

Nash Technical College
Old Carriage Road
Post Office Box 7488
Rocky Mount, North Carolina 27801

December 1982

North Carolina Department of Community Colleges
Division of Planning and Research Services
Occupational Education Research Services
Raleigh, North Carolina 27611

CE 035 966

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

B Fountain

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ABSTRACT

Cost Analysis of Curriculum Programs ("Cost Analysis Project" or "CAP")

Purpose

The purpose of this research project was the design, development, implementation, and testing of a model to examine and evaluate curriculum programs on a cost efficiency basis.

Major Objectives

Major objectives of the project were:

1. To identify the various factors that contribute to the direct cost of curriculum programs
2. To isolate, collect, and analyze the identified cost factors as determined in Objective 1
3. To develop an instrument for reporting the data in a comprehensive, yet readable, form
4. To provide evaluation information from Nash Technical College to the State Department of Community Colleges
5. To develop suggested methods for using the results of the Cost Analysis Project in the allocation of institutional resources
6. To produce a handbook to describe the procedures, methods, and actions required for effecting an institutional cost analysis project for curriculum programs

Concept

The CAP project was designed to use existing information and the computerized data management system at Nash Technical College to evaluate the cost effectiveness of each curriculum program at the College. By combining class section list data and curriculum cost data, an earnback or "efficiency ratio" for each curriculum program cost center (i.e., an accounting cost

control device created to capture all direct instructional cost for one or more related curriculum programs) was obtained. The earnback ratio equaled the total direct cost of instruction (expressed in full-time equivalent, or FTE, units) divided by the number of FTE earned by the curriculum program. Conceptualized in this manner, the earnback ratio is one measure of how efficiently a particular curriculum program uses its fiscal resources.

Data Analysis Methods and Comparisons

Three methods of data analysis were evaluated in this research study. The key factors of each method were:

Name	Key Factors
Method I	Cost: Assigned to a curriculum program based upon the intent of the course Membership Hours: 100% proration of membership hours generated by a course based upon student enrollment in the course
Method II	Cost: Assigned to a curriculum program based upon the intent of the course Membership Hours: Membership hours generated by a course assigned to the curriculum program responsible for teaching the course
Method III (Current State Method)	Cost: Prorated among the "significant" curriculum programs in the course Membership Hours: Membership hours generated by the course prorated among the "significant" curriculum programs represented in the course, without regard to the intent of the course

Following is a table comparing selected features of Methods I, II, and III.

Table 5.1 Comparison of Selected Features of Methods I, II, and III

Feature	Method I	Method II	Method III
1. Direct Cost of Instructional Elements: Instructional salaries, supplies & materials, travel/ subsistence, repairs to instructional equipment, employee benefits, curriculum supervision, leased curriculum equipment	Same	Same	Same
2. Assignment of course to a specified curriculum or a "related" course program	X	X	
3. Assignment of costs based upon assignment of course to responsible curriculum program	X	X	
4. Proration of costs based upon curriculum representation in course			X Modified Proration
5. Proration of membership hours based upon curriculum program representation within course	X Exact Proration		X Modified Proration
6. Assignment of course membership hours based upon assignment of course to responsible curriculum program		X	
7. Ability to preassign cost prior to the determination of curriculum program representation in the course	X	X	
8. Rating of best method for reporting membership hours by curriculum program on 20% report	3	1	2

After carefully reviewing the features of the three curriculum cost analysis methods. Method II was evaluated to be the overall most desirable system to be used at the institutional level. The outstanding features which led to the selection of Method II were:

1. Preassignment of courses to cost centers
2. Ease of assignment of membership hours to curriculum cost centers
3. Simplified 20% report preparation
4. Reduction of change of discrepancy between Business Office cost assignment and membership hour earnback on the 20% report
5. Overall substantial reduction of paperwork burden on the 58 reporting institutions

Major Findings

1. The number of membership hours generated under Method I and Method II was approximately the same.
2. Curriculum programs costed under both Method I and Method II yielded approximately equal efficiency ratios.
3. Curriculum programs with restricted enrollments (i.e., those in which the number of students admitted to the program is limited by State regulations; e.g., Opticinary; or the nature of the instruction; e.g., Developmental Studies)
4. The cost per membership hour varied widely among curriculum programs.
5. More instructional departments have efficiency ratios of 1.0 or greater (i.e., were earning equal or greater "equivalents" than these departments were expanding)

Major Recommendations

1. The CAP Method II should be substituted for the current State cost assessment method (Method III).
2. The membership hours reported on the 20% report should be used as the source for calculating membership hour earnback.
3. The cost analysis system used should be flexible enough to permit the "clustering" of two or more curriculum programs into a single cost center at the discretion of the individual instituion.
4. Evaluation of curriculum programs by each institution should be based on multidimensional criteria (e.g., community need, student need, or equity) in addition to cost efficiency.

ACKNOWLEDGMENTS

The success of the "CAP" research grant was the result of many interested individuals giving their time, talent, and expertise to this project. In addition to those individuals mentioned in Chapter 1 who participated as members of the CAP Advisory Committee and/or as members of the CAP Working Group, special thanks are given to:

- Marcus D. Allred, Vice President of Planning and Research Services, North Carolina Department of Community Colleges, for providing guidance and advice during the project as an "interested observer."
- Fred W. Manley, Coordinator, Occupational Education Research Services, North Carolina Department of Community Colleges, for guidance and assistance throughout the project. (This assistance saved the project director many hours of hard work.)
- Sim D. Wilde, Executive Director, Wilde & Associates, Education Consulting & Support Services, for his support and assistance as project consultant.
- Lorraine Barnes and Libby May, secretaries at Nash Technical College, for spending many hours in preparing the numerous drafts and the final report.
- Oris McCrimmon and Rick Winstead, Media Specialist and Reprographics Assistant, for the preparation of the project slide-tape presentation.

Table of Contents

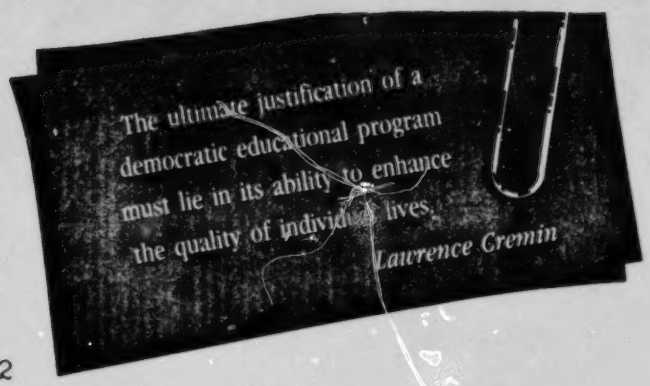
		Page
Abstract		i
Acknowledgments		v
List of Figures		vii
List of Tables		viii
Consultant's Evaluation Report		ix
Chapter I	Introduction to The Study	1
Chapter II	Review of The Literature	6
Chapter III	Research Method	10
Chapter IV	Research Findings	22
Chapter V	Practical Implications of The Findings	33
Chapter VI	Allocation of Resources	41
Chapter VII	CAP Model	43
Chapter VIII	Major Recommendations	47
Appendix A	Bibliography	49
Appendix B	Related Readings	50
Appendix C	Direct Cost of Instruction Worksheet	51

List of Figures

Figure		Page
1.1	Project Management Plan	3
3.1	Cost Analysis Report for Curriculum Programs	21
4.1	Membership Hour Comparison	23
4.2	Efficiency Ratio	26
4.3	Cost Per Membership Hour	29
7.1	Cap Evaluation Model	46

List of Tables

Table		Page
3.1	Cost Center Breakdown	17
4.1	Product-Moment Correlations Between Membership Hours Calculated Under Methods I and II	24
4.2	Instructional Departments	31
5.1	Comparison of Selected Features of Methods I, II, and III	40


The ultimate justification of a
democratic educational program
must lie in its ability to enhance
the quality of individual lives.
Lawrence Cremin

December 14, 1982

MEMORANDUM

To: Mr. Robert Semple
Institutional Research Officer
Nash Technical Institute

From: Sim O. Wilde
Executive Director

Re: Review of Research Procedure for Designing a Cost Analysis Model of Curriculum Programs

In early October of 1982, I was asked to serve as a consultant to Nash Technical College in connection with a research project that had been contracted with the North Carolina Department of Community Colleges. This research project had several purposes aimed basically at recommending a model, based on Nash Tech enrollment and cost factors, for use with cost analysis of curriculum programs in the Department of Community Colleges. My assignment was to monitor the research procedures used, to identify errors or contradictions should they occur, and to make suggestions for improvements if necessary.

My activities in carrying out this assignment were as follows:

1. Conference with Mr. Charles Bucher, Vice President and Mr. Robert Semple, Project Director, both of Nash Tech, to discuss the research project, the funding system of the Department of Community Colleges, and the budgetary system of Nash Technical College.

2. Conference with Ms. Peggy Strickland, Comptroller at Nash Tech, to discuss cost factors in the research procedures.

3. Conference with Dr. David West, Project Analyst at Nash Tech, to discuss enrollment factors in the research procedures.

4. Review and study of the draft of the final report.

It is apparent that changes were made in procedures from the original contract but that all this was done with full approval of the Department of Community Colleges and the Project Advisory Committee.

I find that procedures were accurate and the best that could be used within the constraints of the contract. Furthermore, I concur with the recommendations, particularly numbers one and four. Method II does appear to be the fairest and simplest method of determining cost efficiency, and I believe that cost efficiency is only one of the criteria that should be applied to a course, a curriculum, or a program.

Enc.

CHAPTER I

Introduction to the Study

PURPOSE

The purpose of the Cost Analysis of Curriculum Programs Project (CAP) was to examine and evaluate each curriculum program at Nash Technical College on a cost efficiency basis rather than on an equity, community, or student need basis. The CAP model could be implemented by all institutions within the North Carolina Community College System to examine and evaluate instructional programs in a uniform manner. This evaluation of a curriculum program utilizing the efficiency concept--that is, cost (expenditures) to FTE (full-time equivalent) earnback--provides a more factual base to evaluate a program than does the equity, community, or student need evaluation. It should be noted early that the final program efficiency evaluation document does allow interpretative data to be submitted from departmental personnel and the dean of curriculum programs as a part of the overall evaluation process.

STATEMENT OF THE PROBLEM

The North Carolina Community College System is faced with the problem of providing the communities which it serves with quality educational programs on a limited budget. Many institutions are supporting traditional programs that have "always been a part of curriculum studies" but which are no longer productive, cost effective, or justifiable with respect to the needs of the local community. Other programs have lost their effectiveness due to obsolete equipment and a lag in technology. The magnitude of the problem increases as funding for programs remains at a level below the ever increasing community needs for new and expanding programs. These program needs require that fewer dollars be more wisely spent over larger areas. It has, therefore, become a matter of necessity that educational programs become more cost effective.

There is a significant lack of cost-effective evaluation information in the literature. Considerable efforts have been made to evaluate programs of

instruction on the basis of academic success, community need, and student popularity; however, little emphasis has been placed on program cost.

MAJOR PROJECT OBJECTIVES

1. To identify the various factors that contribute to the direct cost of curriculum programs
2. To isolate, collect, and analyze the identified cost factors as determined in Objective 1
3. To develop an instrument for reporting the data in a comprehensive, yet readable, form
4. To provide evaluation information from Nash Technical College to the State Department of Community Colleges
5. To develop suggested methods for using the results of the Cost Analysis Project in the allocation of institutional resources
6. To produce a final handbook to describe the procedures, methods, and actions required for effecting an institutional cost analysis project for curriculum programs

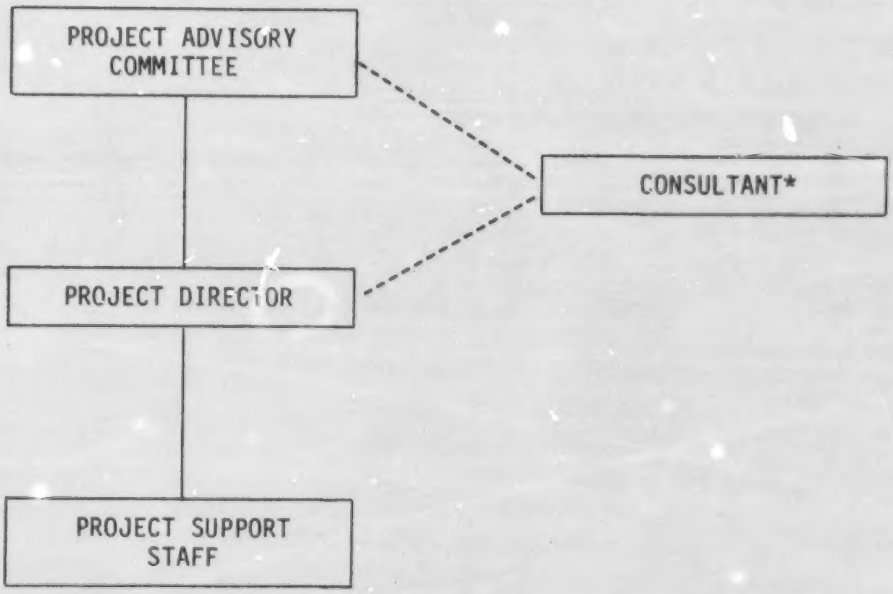
PROJECT ADVISORY COMMITTEE

Vital to the CAP research project was the advisory committee. This group served as a steering body to insure that the project design achieved stated objectives in the most effective manner. The responsibility of the committee was to identify potential project "hazards" unnoticed by the project staff due to their close involvement with the project. The committee executed this responsibility by (1) reviewing the project quarterly and (2) monitoring the project internally.

The project management plan (see Figure 1.1) called for an eight-member advisory committee. The composition of the committee was as follows:

PROJECT MANAGEMENT PLAN

Figure 1.1



*The project consultant was selected by the Advisory Committee. He was utilized to evaluate the overall progress and to provide recommendations and suggestions. Four days of consulting assistance were provided.

a. Two (2) members nominated by the State Department of Community Colleges:

- Julian C. Wingfield, Jr., Director, Management Information Services
- Larry L. Morgan, Director, Auditing and Accounting Services

b. Three (3) members appointed by the President, Nash Technical College:

- Charles A. Bucher, Vice President
- Betsy B. Currin, Dean, Curriculum Programs
- Margaret Strickland, Comptroller

c. Three (3) ex officio members:

- Fred W. Manley, Coordinator, Occupational Education Research Services, North Carolina Department of Community Colleges
- Robert M. Semple, Project Director, Nash Technical College
- David B. West, Project Analyst, Nash Technical College

The primary reason for inclusion of members from the Department of Community Colleges was for coordination and continuous sharing with the goal that the CAP results would be usable throughout the Community College System.

CAP Working Group

One of the principle reasons for the success of the Cost Analysis Project was the implementation of the "working group concept." The working group controlled the direction and scope of the research project and was composed of key institutional personnel (most of whom in this case were, also, members of the advisory committee and project staff) who ultimately would use the CAP results. These individuals had a vested interest in the final product and were:

Name	Institutional Responsibility	Project Responsibility
Charles A. Bucher	Vice President	Advisory Committee Member
Joyce Taylor	Educational Development Officer	CAP Working Group Member

Name	Institutional Responsibility	Project Responsibility
Betsy B. Currin	Dean, Curriculum Programs	Advisory Committee Member
Anne Hancock	Computer Operator	Statistical Aide
Robert M. Semple	Institutional Research	CAP Director & Working Group Chairman
Margaret Strickland	Comptroller	Advisory Committee Member
David B. West	Coordinator, Computer Services	Project Analyst

This group of individuals worked as a cohesive body in planning and implementing appropriate actions for each phase of the project. Once a consensus was reached, the action plan was enthusiastically executed by the appropriate individuals.

The working group method of implementing the CAP Research Project was extremely valuable and effective in the following ways:

1. The working group combined key institutional personnel and research staff into a single group to achieve a research goal and a Nash Technical College goal of determining the cost effectiveness of the College's curriculum programs.
2. The institutional users of the cost analysis data assisted the working group by having input into what data to collect and the method for evaluating the curriculum programs.

The working group concept allowed the developers, the users, and the data suppliers to act in a coordinated manner which resulted in the success of the project. The working group achieved lasting results, as everyone in the institution had a vital part in developing the final cost analysis product.

CHAPTER II

Review of the Literature

REVIEW OF THE LITERATURE

A review of the literature revealed that the field of cost analysis research is a relatively new area of study. However, the mounting concern shared by taxpayers, legislators, and educators with regard to the increasing cost of education makes any cost analysis study electric material for institutional internal evaluation. Cage and Fowler state ". . . the process of cost analysis of educational programs is the leading step toward receiving more adequate funding for all education programs." (1:2) Education institutions are beset by increasing costs. No longer can budgeting for curriculum programs be computed by adding a percentage increase to the previous year's expenditures. Accountability is the battle cry! The Reality-Based Evaluation (RBE) and the Program-Planning-Budgeting System (PPBS) have attempted to respond to this cry. Both of these systems allocate costs to academic programs by linking credit or contact hours to expenditures. Their priorities were to determine to what curriculum programs dollars were allocated, but these studies did not indicate how effectively the dollars were spent. A review of the literature revealed no project which reflected resource utilization efficiency.

Costing Standards

In reviewing the literature, basic standards for the foundation for the measurement and reporting of cost data were discovered. These standards are applicable to any cost analysis program. From the twelve costing standards as set forth in the Discipline Cost Analysis Manual of the Maryland Community Colleges, nine were found to relate to the CAP study. These nine standards were:

1. The purpose for which cost information is to be used should determine the framework within which cost information is developed.

2. Cost information should be based on the accrual method of accounting. The accrual method of accounting has as its main objectives reporting revenue when it is earned (regardless of when it is collected) and reporting expense in the period it is incurred (regardless of when the cash disbursement is made).
3. Cost data should be reconcilable to official accounting data.
4. Non-financial data should be reconcilable to official institutional records.
5. Definitions used in cost determinations should be applied uniformly.
6. Cost information and related costing units should cover the same period.
7. Cost information should be consistently determined.
8. Cost should be attributed to a cost objective based on a causal or beneficial relationship.
9. Common cost incurred to provide two or more services should be allocated in an equitable manner. (2:7-9)

Program Cost Studies

The question of which elements should be included as curriculum cost items is subject to much discussion. The studies reviewed generally separated program cost into direct instructional cost and related cost. In the Washington State Unit Expenditure Study, the total direct instructional cost include salary, benefits, and direct support costs. "Direct support costs include such departmental, divisional, and/or college costs as other wages and salaries (clerical, laboratory assistants, etc.), equipment, supplies, and other current expenses." (3:16) The Community College System of Illinois equates direct instructional costs with the term "net instructional cost." "Net instructional cost includes direct salary costs, direct departmental

costs, other allocated costs, operation and maintenance, and building rental." (4:4) Operation and maintenance dollars are not considered in the Washington State cost analysis system as a factor in the direct cost of curriculum instruction.

In the Illinois cost study, the definition of net instruction cost includes allocated costs. By their definition, allocated cost ". . . . consists of various indirect costs which are allocated by the computer program and which include learning resources, student services, data processing, general administration, general institutional services, indirect equipment, and general academic administration." (5:4) The allocated costs are assessed in some arbitrary method such as a per student, per credit hour, or per contact hour basis. The assessment of costs to a curriculum program in this manner may not reflect the true cost. In reality, the Illinois net cost of instruction includes many related instructional cost items if one uses the Washington State Cost system as the base. Vast differences can be seen between what two states consider as elements of instructional costs.

Impact of Literature on CAP

The research studies selected for indepth review were silent as to how to address procedurally such problems as prorating the costs of individuals whose job functions cross multi-departmental individuals; thus, any formal time-study audits would be prohibitive and any proration would be arbitrary. This is a problem facing any small community college.

As defined in Costing Standard Number 1 in the Maryland study, cost information should determine the framework within which cost information is developed. Identifying the various factors that contribute to the direct cost of curriculum programs is the foundation upon which a cost analysis project rests. A review of cost study literature revealed the existence of a wide range of cost factor inclusion/exclusion options. What is obvious is

that the factors selected by the Nash Technical College study (as elements contributing to the direct cost of curriculum programs) must satisfy its data users. Many cost factors used in the Washington State and Illinois studies were not applicable to the CAP study because the primary data users at Nash Technical College would be institutional personnel concerned with the direct controllable cost factors of curriculum programs.

CHAPTER III

Research Method

Introduction

The CAP Working Group, Nash Technical College (NTC) research project staff, and NTC members of the project advisory committee met to review the research objectives and to determine the most effective manner to implement a cost analysis system at NTC. Three basic operating parameters were established for the project. These parameters were:

1. Existing personnel and data (with some modification) must be used to the maximum extent possible. The implementation of any cost analysis system must be accomplished with current staff and from already existing data within the college. NTC or any other educational organization would not look favorably toward implementing a system which would require additional personnel or which would increase reporting requirements.
2. Identified cost factors charged to the academic programs must be meaningful and controllable by institutional users. As a result, a number of the cost factors used in the Washington State and Illinois cost studies were judged to be inappropriate to the CAP study. The NTC CAP study was designed primarily for use at the institutional level. The institutional users were concerned with the most direct cost of curriculum programs with as few prorated costs as possible.
3. The CAP should use data that are readily available at other institutions.

Direct Cost of Instruction Factors

The first CAP objective, identification of the factors that contribute to the direct cost of curriculum programs, was the most difficult part of the project. The CAP working group made an in-depth analysis of the

following major accounting areas:

- General Administration
- Instruction - Curriculum
- Learning Resources
- Student Development (Services)
- General Institution
- Equipment

The CAP working group and the project advisory committee decided that the following cost factors constituted the Direct Cost of Instruction:

1. Instructional salaries
2. Supplies and materials
3. Travel/subsistence
4. Repair of instructional equipment
5. Employee benefits
6. Curriculum supervision
7. Leased curriculum equipment

Equipment cost for each program was reported and available for review on the CAP Report but was not considered a part of the total direct cost of instruction. The rationale supporting the exclusion of equipment expenditures was that equipment money availability varies widely from year to year and is, therefore, allocated on a critical need basis. Thus, for example, if a program received $25,000 for equipment in the following manner: year 1 - $20,000; year 2 - $00.00; year 3 - $5,000; the results would greatly distort the three efficiency ratios for that program computed on an annual basis.

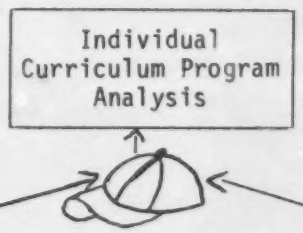
Earning Resources

State resources are allocated on the basis of earned full-time equivalents, or FTEs. FTE earnings are based upon the number of student

membership hours earned by a program. When membership hours are converted by formula, they equate to FTEs. In the North Carolina Community College System, funding is based on the number of FTEs earned by the institution. Each FTE is funded with a specific dollar value. The number of FTEs earned multiplied by the FTE dollar amount equals curriculum funding. Each academic program's FTE for the year can be equated to the dollar resources returned to the College.

Curriculum Program Analysis

The CAP curriculum program analysis was designed to analyze cost and resource earnback data. This data has always been available at the institutions in some form; however, because the reporting systems have not been coordinated, critical evaluative information has not been available to the institution. The figure below illustrates how the machine readable data from the institution's student information system and financial system can be interfaced in order to provide the president and other key personnel with important curriculum cost data.



Student Information System Data

Course Master File
Quarterly Schedule
Section List

Business Office Financial Data

Instruction Curriculum
General Institution
Equipment

Operational Definitions

Full-Time Equivalent (FTE): The full-time equivalent is the basis for allocation of State funds to institutions. One full-time equivalent, FTE, is representative of the amount of time a "typical" student would attend

class. One FTE is defined as a student enrollment of 16 hours of class, shop, or laboratory per week for 44 weeks (the full four-quarter year), or 704 hours.

Cost (Expenditure): This is the act or process of expending money. In this case, the cost or expenditure of funds for the items selected represent the direct cost of instruction and equipment.

Direct Cost of Instruction: These are the items that were used in evaluating the cost of instructional programs. The seven items considered in this category were instructional salaries, supplies and materials, travel/subsistence, repair of instructional equipment, employee benefits, curriculum supervision, and leased curriculum equipment.

Cost Center: A cost center is an accounting cost control device created to capture all the direct instructional costs. A cost center can consist of one or more related curriculum programs whose instructional costs have been aggregated for the purpose of tracking instructional costs. (See Table 3.1 for the cost centers used in this study.)

Related Courses: These are general courses which are required by the majority of curriculum programs within the institution. Examples are selected English, mathematics, and reading courses.

Program (Curriculum): This is a group of related activities (courses) used to achieve goals and objectives of the individual. (4:17).

Evaluation: This is a systematic process to determine or estimate the effectiveness of a particular program. (4:17).

The Cost Analysis Algorithm

The purpose of the Cost Analysis Project was to evaluate each curriculum program on an efficiency basis. An evaluation of efficiency is based on the Earnback Ratio which can be defined as:

$$\frac{\text{FTE Units Earned}}{\text{FTE Units Costs}} = \text{Earnback Ratio}$$

An earnback ratio greater than 1.0 indicates the program is earning more money than it costs. An earnback ratio of 1.0 means that the program is "breaking even" with direct instructional costs. An earnback ratio of less than 1.0 means the program is earning back less than its direct instructional costs.

The following example illustrates the steps involved in the computation of an efficiency ratio:

Step 1: Determine the resource earnback for curriculum program if the given program earned 42,240 membership hours for the year: (4 quarters)

$$\frac{42{,}240 \text{ Membership Hours}}{704} = 60 \text{ FTEs}$$

This program's resource earnback was 60 FTE.

Step 2: Compute the cost in FTE units: If the total direct cost of instruction for a given program is $36,000 and if the State allocation for one FTE student equals $1,200, then the cost of the program would equal 30 "FTE Units":

$$\frac{\$36{,}000 \text{ (Total Direct Cost of Instruction)}}{\$1{,}200 \text{ (\$ Value of 1 FTE Unit)}} = 30 \text{ (Cost expressed in FTE Units)}$$

Step 3: Determine the resource earnback ratio:

$$\frac{60 \text{ (FTE Units Earned)}}{30 \text{ (FTE Units Cost)}} = 2 \text{ (Earnback Ratio)}$$

This ratio indicates that the program is earning back twice the cost of operating the program.

The Earnback Ratio is an efficiency indicator and not an indicator of the value of the program to the students, the school, or to the community. With the current uniform dollar funding per FTE regardless of program, it is expected that some curriculum programs will have an efficiency ratio of less than 1.0 and that some will have high efficiency ratios. The overall institutional efficiency ratio, however, should be approximately equal to or

greater than 1.0.

Description of CAP Computer Program

This section discusses the method used to aggregate student membership hours.

Basic Concepts

1. Machine readable course section lists from summer and fall terms, 1981, and winter and spring terms, 1982, contained:
   a. a course designation (e.g., EDP-104) and
   b. a curriculum code (e.g., T-169, V-001) for each student enrolled in that section.
2. A machine readable "course master file" contained:
   a. the curriculum code that reflected the "instructional intent" of the course as judged by the Dean for Curriculum Programs (e.g., all welding courses were assigned a curriculum code of V-050) and
   b. the membership hours for the course.
3. In consultation with the Project Advisory Committee, the Working Group set up the following special rules for aggregating data:
   a. Membership and credit hours for "special" (G-030) students would be counted toward the intent of the course.
   b. Hours generated by "related courses" would be counted toward the General Studies Department totals.

Data Aggregation Procedures

The following specific steps were followed in aggregating membership and credit hours:

1. The course designation on the section list was matched with the designation on the course master file.
   a. If an attempted match was successful, the course curriculum

code, membership hours, and credit hours were read from the course master file.

b. If the attempted match was unsuccessful (fewer than 1% of the attempted matches were unsuccessful), the course was assigned the following:

Curriculum Code: UNKNOWN

Membership Hours: 4

Credits: 3

2. The curriculum code for each student enrolled in the section was then read.
3. If the course was a "related" course; all student membership and credit hours were assigned to the General Studies curriculum totals.
4. For a "special" (G-030) student his/her hours were assigned to the curriculum code that reflected the intent of the course.
5. If the student's curriculum code was unknown, the hours were assigned to "Curriculum Code: Unknown."
6. Otherwise, the student's membership and credit hours were assigned to one of the 34 curriculum programs listed in the Nash Technical College Catalog.
7. Finally, membership and credit hours from the 34 curriculum programs were further aggregated to reflect the 19 cost centers used at Nash Technical College. (see Table 3.1.) For example, data from the four secretarial curriculum programs (T-030, T-031, T-032, and T-033) were aggregated to reflect the cost center for the Secretarial Option's Program.

TABLE 3.1

Cost Center Breakdown

Cost Center	Programs
General Education	General Education
General Studies	General Studies (Related Courses) Developmental Studies
Business Options	Accounting Business Administration Marketing and Retailing Banking and Finance Real Estate Postal Services Management
Secretarial Options	Secretary - Executive Secretary - Legal Secretary - Medical General Office Technology
Basic Computer Programming	Basic Computer Programming
Teacher Associate	Teacher Associate
Nursing Education Options	Nursing Education Options
Criminal Justice	Criminal Justice
Nurse Assistant	Nurse Assistant
Agricultural Science and Mechanization	Agricultural Science and Mechanization
Architectural Technology	Architectural Technology
Electronic Engineering	Electronic Engineering
Automotive Mechanic/Technician Apprentice	Automotive Mechanic/Technician Apprentice
Auto Body Repair	Auto Body Repair
Automotive Mechanics	Automotive Mechanics
Electrical Installation and Maintenance	Electrical Installation and Maintenance
Welding	Welding
Industrial Lab Assistant	Industrial Lab Assistant
Clothing Construction	Clothing Construction

An Alternate Method of Data Aggregation

As noted in the previous section, in order to determine the "intent" of a particular course for the purpose of assigning membership hours earned by "special" (G-030) students enrolled in that course, each course offered at NTC was assigned to a specific curriculum program. This aspect of the design of the study permitted an alternative analysis method that employed these same data in which membership hours were aggregated to the curriculum program that was responsible for teaching the course.

For purposes of discussion in the remainder of this report, these methods have been designated:

1. Method I (described in detail in the data aggregation section) in which membership hours were aggregated to the student's curriculum program; and
2. Method II (the alternative method described above) in which membership hours were aggregated to the curriculum program that was responsible for teaching the course.

Method II has obvious appeal to reporting institutions in that it is easy to use and it parallels resource allocation procedures typically employed at many universities and other post-secondary institutions. That is, Method II monitors the funding of curriculum programs on the basis of the total number of membership hours taught by a particular curriculum program (or in a larger institution or university by a particular department) rather than on the basis of the number of membership hours generated by "majors" in a particular curriculum program (as under Method I).

A third method (discussed in Chapter V and labeled "Method III"), a combination of Methods I and II, is currently required by the State Department of Community Colleges.

Chapter IV of this report will compare the curriculum costs yielded by both Methods I and II. Chapter V will discuss the practical implications of implementing the three methods on the local level and the utility of each.

Extra Data for Internal Use ONLY

The efficiency ratio is not the only product derived from the CAP report. (See Figure 3.1 for a sample of the CAP Report Form used for each academic program.) Some other quantifiable data elements which can be provided for administrative review (if deemed appropriate) are:

- Program cost on an FTE basis
- Program cost on a dollar basis
- Program earnback on an FTE basis
- Program earnback on a dollar basis
- Cost per membership hour on a dollar basis
- Equipment expenditure on a dollar basis

Other quantifiable data elements can be added to this section of the report to meet specific institutional requirements.

Quantifiable data alone cannot tell the complete story about curriculum performance. Events which could not be foreseen can impact upon a program and greatly effect the efficiency ratio. In order to allow for a fair and impartial program evaluation, two sections for qualitative comments from departmental chairpersons have been included on the CAP Report Form.

It is very important that when a program's performance, (as expressed in the efficiency ratio) is below expectation, the opportunity for discussion is provided. The narrative evaluation on the first part of the form allows for such a discussion. (See Figure 3.1, Part IIB.)

The second section of qualitative input from the department chairperson concerns future resources of the academic program. (See Figure 3.1, Part IIC.) The future need section allows department chairpersons to project the program's institutional resource requirements.

The final step in the CAP report preparation is the comments/review of the quantitative data and qualitative comments of the department chairpersons and by the Dean of Curriculum Programs. (See Figure 3.1, Part IID.)

Figure 3.1 - Cost Analysis Report for Curriculum Programs

CAP REPORT FOR

_____PROGRAM

Part I - Earnback Ratio

The Earnback Ratio is the total FTEs earned by the program divided by the cost of the program expressed in FTEs. The cost of a program is based on the following factors: instructional salaries, supplies and materials, travel/subsistence, repairs of instructional equipment, employee benefits, curriculum supervision, and leased curriculum equipment.

The Earnback Ratio for this program is _____.

Part II - Additional Data (For Institutional Use Only) (Optional)

A. Amplification of earnback data

1. Program Cost (FTE basis):
2. Program Cost (dollar basis):
3. Program Earnback (FTE basis):
4. Program Earnback (dollar basis):
5. Cost Per Membership Hour:
6. Equipment Expenditure:

B. Comments concerning program performance during the last academic year _____. (To be completed by Department Chairperson or designated representative.)

C. Comments concerning program needs for the coming academic year _____ which may affect budget allocations. (To be completed by Department Chairperson or designated representative.)

D. Comments/review by Dean of Curriculum Programs.

CHAPTER IV

Research Findings

Five major findings resulted from the data provided for the Cost Analysis Project. These findings are discussed in the subsequent paragraphs.

FINDING I: The number of membership hours generated under Method I and Method II was approximately the same.

Discussion

The most important finding from the standpoint of cost analysis methodology was that, with a single exception, the number of membership hours generated under both methods was approximately the same. The Pearson product-moment correlation between the membership hours yielded by both methods was .984 ($t = 22.77$; $p < .005$). The high degrees of correlations between the results yielded by both methods is shown in Figure 4.1. (Codes indicated at the bottom of each figure.)

In order to ascertain the degree of reliability of this extremely high correlation, which was calculated on the basis of data for an entire year, correlations were computed between membership hours generated under both methods for each of the four terms. As shown in Table 4.1, these correlations ranged from .938 (summer) to .993 (winter). The simple arithmetic mean correlation over the four terms was .967. (The weighted statistical mean correlation using Fisher's r to z transformation, which gives more weight to higher correlations, was .975.)

Figure 4.1 **MEMBERSHIP HOUR COMPARISON**

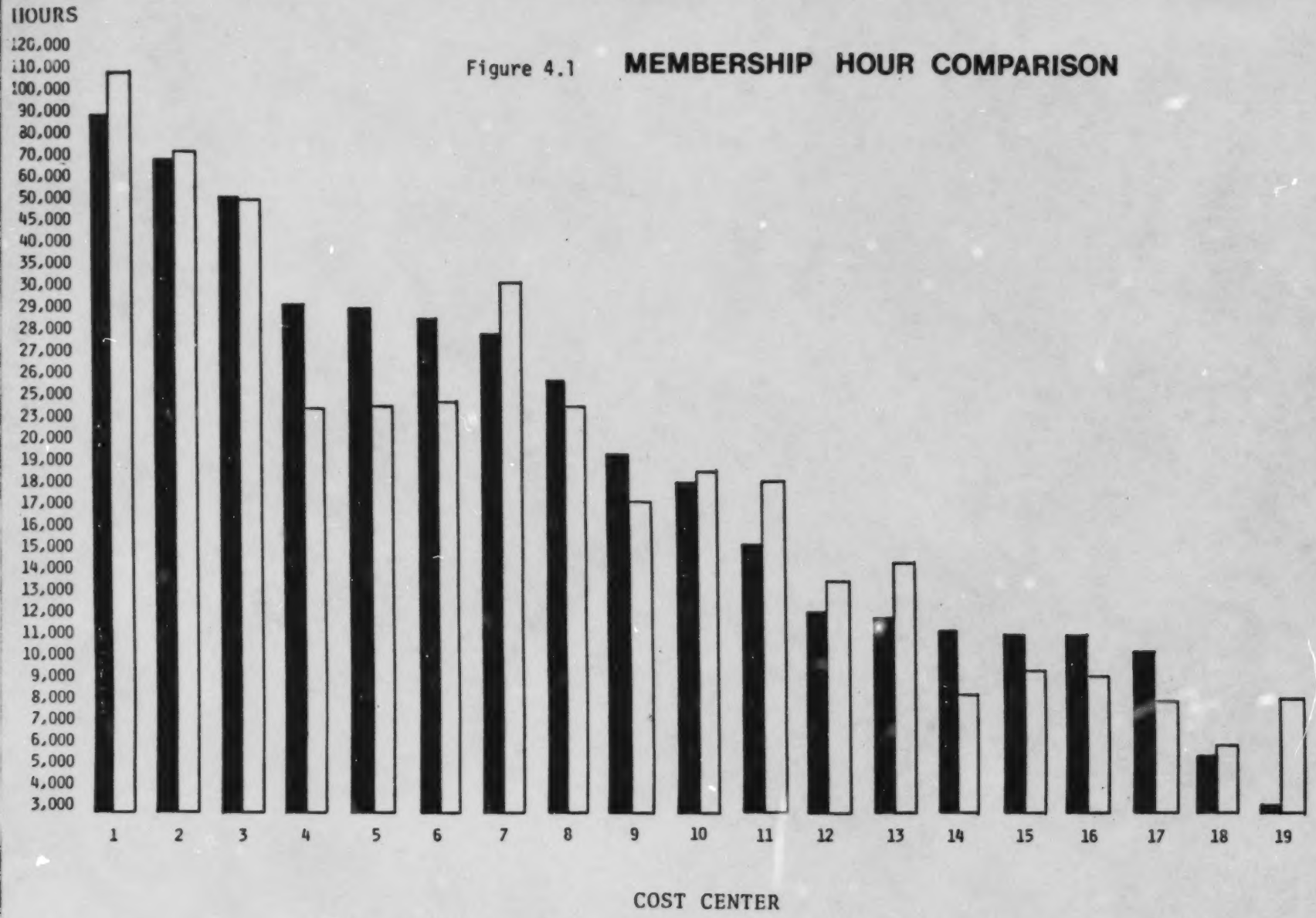


Table 4.1

Product-Moment Correlations Between Membership Hours Calculated Under Methods I and II

Term	r
Fall	.979
Winter	.993
Spring	.959
Summer	.938
Arithmetic Mean Correlation	.967
Weighted Statistical Mean Correlation*	.975

*Calculated using Fisher's r to z transformation.

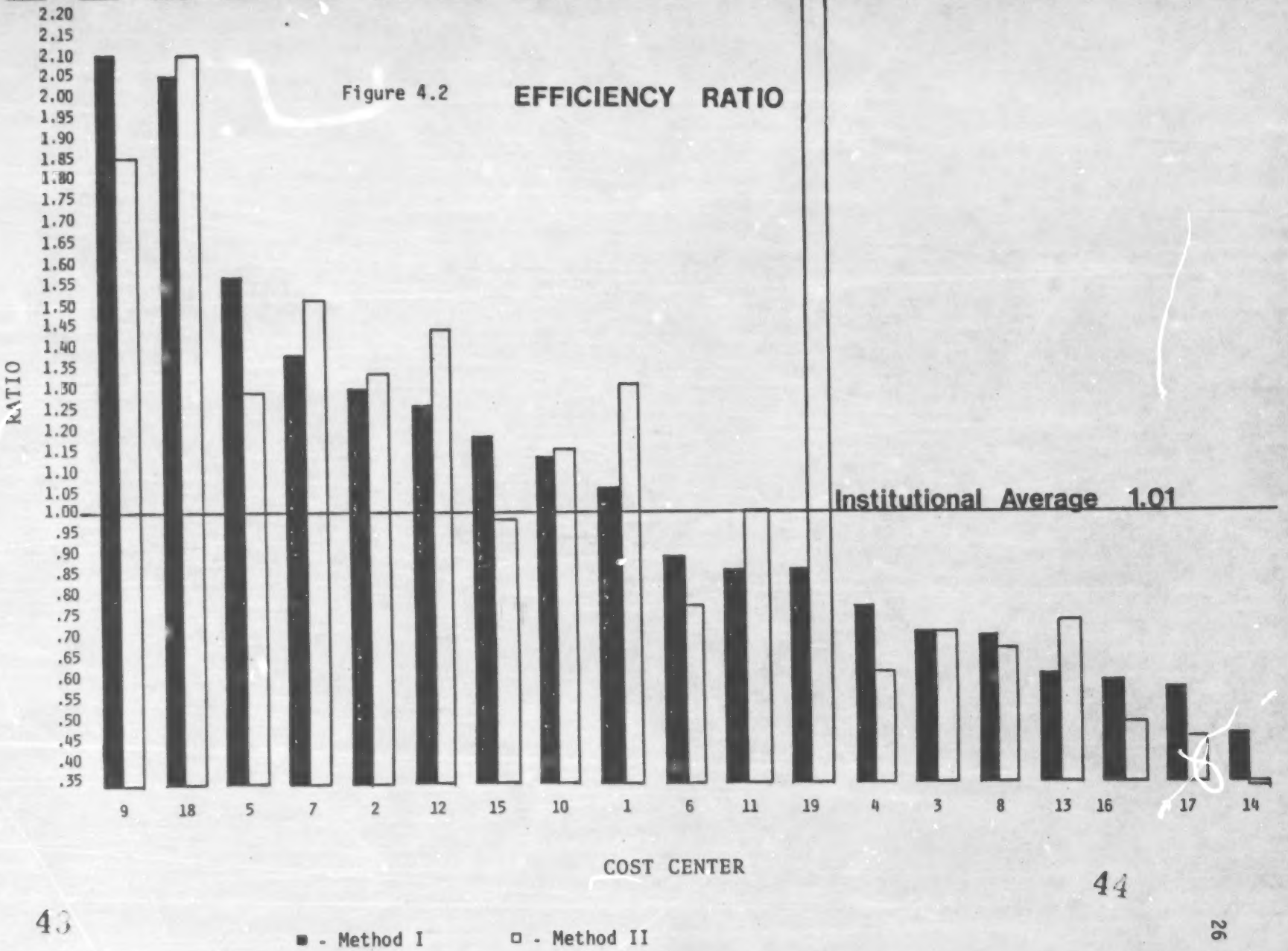
FINDING II: Curriculum programs costed under both Method I and Method II yielded approximately equal efficiency ratios.

Discussion

Figure 4.2 displays efficiency ratios calculated under both costing methods. The horizontal solid line in the figure depicts the overall institutional efficiency ratio of 1.01. As shown in the figure, Method I yielded nine programs (47% of total) with efficiency ratios of above 1.0, while Method II yielded ten programs (53% of total) with efficiency ratios of above 1.0.

The efficiency ratios of programs costed under Method I ranged from 0.46 to 2.11, while those costed under Method II ranged from 0.35 to 2.27. Method II yielded both the wider range of efficiency ratios and the higher number of curricula with efficiency ratios above 1.0. (The only curriculum program that showed a substantial divergence between the two methods was one of the low-enrollment programs.)

Figure 4.2


EFFICIENCY RATIO
RATIO
2.20
2.15
2.10
2.05
2.00
1.95
1.90
1.85
1.80
1.75
1.70
1.65
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
.95
.90
.85
.80
.75
.70
.65
.60
.55
.50
.45
.40
.35
Institutional Average 1.01
9 18 5 7 2 12 15 10 1 6 11 19 4 3 8 13 16 17 14
COST CENTER
■ - Method I
□ - Method II

FINDING III: Curriculum programs with restricted enrollments yielded lower efficiency ratios than programs with nonrestricted enrollments.

Discussion

A restricted curriculum program was one in which the number of students admitted to the program was limited by State regulations (e.g., Nursing Education Options), number of available work stations (e.g., Opticianry), or nature of instruction (e.g., Developmental English or Math courses).

It would be expected that curriculum programs with restricted enrollments would have lower efficiency ratios than programs with no restrictions on enrollments because costs would have to be divided over fewer students. This was indeed, the case: Under Method I, four of six curriculum programs with restricted enrollments yielded efficiency ratios of less than 1.0. Under Method II, five of the six restricted enrollment programs were calculated to have efficiency ratios of under 1.0.

FINDING IV: The cost per membership hour varied widely among curriculum programs.

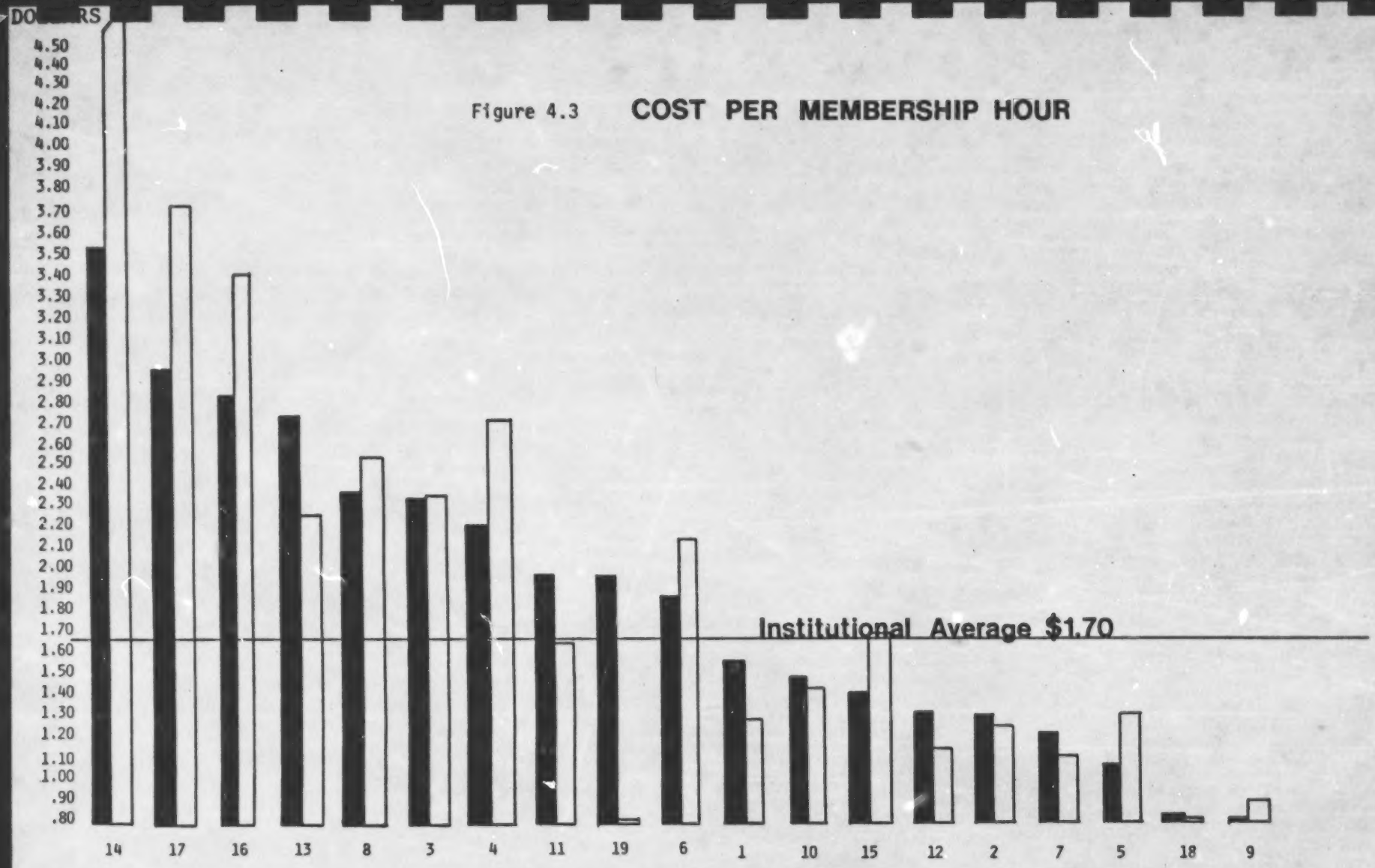
Discussion

Figure 4.3 displays the costs per membership hour calculated under both costing methods. The horizontal solid line in the figure represents the overall (weighted) institutional average cost per membership hour of $1.70 which was calculated by dividing the total costs by the total number of membership hours. IT SHOULD BE EMPHASIZED THAT THIS AVERAGE APPLIES ONLY TO NASH TECHNICAL COLLEGE AND IN ABSOLUTELY NO SENSE SHOULD BE CONSIDERED AT REPRESENTATIVE OF OTHER COMMUNITY COLLEGE SYSTEM INSTITUTIONS.

As graphically depicted in Figure 4.3, the cost per membership hour calculated under Method I ranged from $0.81 to $3.58 with a mean (over the 19 curriculum cost centers) of $1.91, a variance of $0.70, and a standard deviation of $0.77. The cost per membership hour calculated under Method II ranged from $0.75 to $4.98 with a mean of $1.99 per curriculum program, a variance of $1.26, and a standard deviation of $1.12.

While the resulting costs per membership hour calculated under both methods were highly correlated ($r = .90$) and the mean costs were approximately equal, the costs per membership hour were more variable when calculated under Method II than Method I. The most probably explanation for this finding is that the curriculum programs yielding the largest deviations between the methods were all programs with small enrollments that primarily serve their curriculum's "majors." Thus, the "out-migration" of students enrolled in these programs compared to other curriculum programs in order to take courses in supporting and related subjects exceeds the "in-migration" of students who are taking the specialized courses that are offered by these programs.

Figure 4.3 **COST PER MEMBERSHIP HOUR**



FINDING V: More instructional departments have efficiency ratios of 1.0 or greater under Method II than under Method I.

Discussion

Nash Technical College's resources are allocated among four instructional departments. (See Table 4.2.) These funds are, in turn, allocated within these departments to the various curriculum programs under their jurisdictions. Under Method I, two of the four departments yielded efficiency ratios of 1.0 or better while under Method II, three of the departments had efficiency ratios of 1.0 or better. The reason for this is the more even distribution of membership hours under Method II of the departments actually teaching the courses.

Table 4.2

Instructional Departments

Business Department

- Accounting
- Business Administration
- Marketing and Retailing
- Banking and Finance
- Real Estate
- Postal Services Management
- Secretary - Executive
- Secretary - Legal
- Secretary - Medical
- General Office Technology
- Basic Computer Programming

General Education and General Studies Department

- General Education
- Developmental Studies
- General Studies (related courses)

Public Services Department

- Teacher Associate
- Nursing Education Options
- Criminal Justice
- Nurse Assistant

Engineering Department

- Agricultural Science and Mechanization
- Architectural Technology
- Electronic Engineering
- Automotive Mechanic/Technician Apprentice
- Auto Body Repair
- Automotive Mechanic
- Electrical Installation and Maintenance
- Welding
- Industrial Lab Assistant
- Clothing Construction

SUMMARY

The findings of the CAP effort can be summarized as follows:

1. The number of membership hours generated under Method I and Method II was approximately the same.
2. Curriculum programs costed under both Method I and Method II yielded approximately equal efficiency ratios.
3. Curriculum programs with restricted enrollments yielded lower efficiency ratios than programs with nonrestricted enrollments.
4. The cost per membership hour varied widely among curriculum programs.
5. More instructional departments have efficiency ratios of 1.0 or greater under Method II than under Method I.

CHAPTER V

Practical Implications of the Findings

The purposes of this chapter are to (1) evaluate three curriculum cost analysis methods, (2) determine the strengths and weaknesses of each method, and (3) make a recommendation as to the "best" method from an institutional point of view. To review, the three methods are:

Name	Key Factors
Method I	Cost: Assigned to a curriculum program based upon the intent of the course Membership Hours: 100% proration of membership hours generated by a course based upon student enrollment in the course
Method II	Cost: Assigned to a curriculum program based upon the intent of the course Membership Hours: Membership hours generated by a course assigned to the curriculum program responsible for teaching the course
Method III (Current State Method)	Cost: Prorated among the "significant" curriculum programs in the course Membership Hours: Membership hours generated by the course prorated among the "significant" curriculum programs represented in the course, without regard to the intent of the course

The concept and operation of Methods I and II and their results have been discussed in detail in Chapters III and IV of this report. It is appropriate that discussion be devoted to outlining Method III (current State method) prior to comparing the three curriculum cost analysis methods.

At the time NTC was awarded the research grant in July 1981, the State had no announced plans to initiate a cost analysis system until the CAP Research project results were evaluated. However, the development of a cost analysis system at the State level became a high priority item

resulting in the implementation of a State mandated system beginning in July 1982. (This approach has been labeled "Method III.")

The importance of being able to analyze curriculum costs can be found in the report to the "new" State Board of Community Colleges. The document, Report of the Community College and Technical Institute Planning Commission, dated May 1980, states this concern on page 47:

> "...practice of state funding of all curriculum programs, FTE at the same dollar value, regardless of the actual (and differing) costs of producing the respective programs. A high-technology course, requiring extensive equipment for demonstration and training purposes and a low ratio of students per instructor, will earn for the institution the same number of dollars per FTE as does a course which requires few resources beyond teacher, textbook, and classroom. The almost inevitable result is that, since the lower cost programs must help carry the higher cost technical programs, the institutions are tempted to promote enrollments in the former to enable them to offer the latter programs.
>
> We find this to be an undesirable and unwise policy."

Thus, when the new State Board of Community Colleges became operational in January, 1981, they charged the Department of Community Colleges (DCC) to begin implementing action relative to this concern. Method III, which was developed by the Department of Community Colleges, operates on a proration of cost and membership hours to "significant" curriculums represented in the course. The proration of membership hours and cost are not exact. Details of the system can be found in the "Accounting Procedures Manual" on pages 1.148-1.156 and 3.2-3.5, Memo CC-82-129, Memorandum dated October 11, 1982, Subject: Proper use of "Departmental Code."

Evaluation of the Three Methods

The following sections evaluate the selected elements of the three methods and then present recommendations concerning a method which best fulfills the needs of both the DCC and the reporting institutions.

Element 1: Curriculum Cost Factors

The curriculum cost factors which were considered to be the most critical are the same in all three methods. The NTC CAP Working Group determined that the critical items were: instructional salaries, supplies and materials, travel/subsistance, repairs to instructional equipment, employee benefits, and costs of curriculum supervision. At the quarterly advisory committee meeting, these six elements were approved; as well, leased curriculum equipment was added to the list. It was concluded that equipment costs would be monitored but not included. It would appear that both the DCC and the CAP Working Group independently arrived at the same conclusion as to what elements were to be considered part of the direct costs of instruction.

Element 2: The ability to preassign course costs to a curriculum cost center.

Both Methods I and II allow for preassignment of the dollars to curriculum cost centers. This practice has numerous advantages. Some of these are:

1. Individuals responsible for preparing part-time instructor contracts can indicate on the contract the cost center to be charged well in advance of the start of the quarter.
2. The Business Office is able to handle part-time salary data faster and more efficiently because of the additional lead time provided.
3. The ability to achieve consistent costing paramenters is enhanced, since each course is already assigned to a specified

curriculum program on a course assignment master file. By referring to this file an individual can find the proper cost center. Thus, whether the person is using salary distribution sheets or using the class roster to prepare the 20% report, the results will be identical.

4. The paperwork and time involved in handling the class rosters, salary distribution sheets, and the 20% report are dramatically reduced; thus, contributing to the generally desirable goal of reduced paperwork burdens on reporting institutions.

Method III prorates costs of instruction based upon the "significant" representation of students within a course. This method requires the quarter to be in session before any costing can begin. From an institutional operating point of view, the 20% point of the quarter is probably the best point at which to prorate the instructional cost. This means that the Business Office is starting the proration at a minimum of eleven (11) class days into the quarter. (In reality, the time lag would be closer to fifteen (15) class days.) If part-time instructors are paid monthly, then a significant extra burden is placed on the Business Office.

Either Methods I or II, with each's ability to preassign costs to curriculum programs, is better than Method III from the institution's perspective.

Element 3: An ability to reassign the responsibility of teaching a course to a specific curriculum or to a "related" program area.

Both Methods I and II assign every course to a specific curriculum or to a "related" course program. Under Method I, a program is charged with all the costs of the course -- yet it only receives credit for the membership hours generated by its majors enrolled in that course. Under

Method II, on the other hand, all of the membership hours generated by the course are assigned to that curriculum program.

While the costs generated under both Methods I and II have been aggregated to the level of the 19 curriculum cost centers tracked by the NTC Business Office (See Table 3.2.), the following example clearly illustrates the difference among the methods at the level of individual courses.

The example concerns BUS 229 (Personal Taxes) which generates 66 membership hours per student. The enrollment in the course is detailed below:

Class Section List for BUS 229

Program Represented	Number of Students	Membership Hours
Business Administration	10	660
Basic Computer Programming	5	330
Accounting	8	528
Secretarial Options	3	198
General Occupational Technology	2	132
Electronic Engineering	2	132
Class Total	30	1,980

Under Method I, the total cost of teaching the course ($462) would be charged to the Accounting curriculum, and the membership hours would be divided among the six curriculums whose students are enrolled in the course. The Accounting curriculum would be charged a cost of $0.88 per membership hour ($462 ÷ 528 membership hours) for teaching its majors enrolled in the course. That is, it would be charged $0.88 per membership hour for accomplishing its primary teaching mission of instructing Accounting majors.

Under Method II, the total cost of teaching the course would still be assigned to the Accounting curriculum. However, all of the membership hours would also be assigned to the Accounting curriculum. This reduces the cost per membership hour that is charged to the Accounting curriculum from $0.88 to $0.23 ($462 ÷ 1980 membership hours), a reduction of nearly 80 percent.

Method III considers the "intent of the course" taught by the majority of the curriculums represented. While this is consistent with the costing practice, the "intent of the course" can change from course to course within the quarter. The "floating" course intent can lead to unnecessary difficulty in reconciling the proration of cost and membership hours of the 20% report.

Either Method I or Method II is preferable because responsibility for teaching the course can be assigned to a specific curriculum cost center.

Element 4: Reporting course membership hours on the 20% report.

Method II was rated as the "best" method of handling membership hours generated by a course. All membership hours earned by a course would be assigned to the same curriculum to which the course costs are charged. This method simplifies the 20% report in that a single line entry is all that is required for each course taught.

Method III can be rated as second best in this respect because it requires the listing of fewer curriculums than does Method I; however, it lists a greater number of curriculums than does Method II. However, a significant disadvantage of Method III is that time consuming judgment is required to evaluate what constitutes "significant representation" in a particular course. Thus, Method III will cause a dramatic increase in the amount of time needed to prepare the 20% report and will increase the volume of the report.

Method I is the least desirable method since the curriculum membership hours must be prorated over 100% of the represented programs. This would be extremely time consuming and, thus, counter-productive in preparation of the 20% reports.

Conclusion

After carefully reviewing the features of the three curriculum cost analysis methods, Method II was considered to be the "best-all-around" method to be used at the institution level. The outstanding features which led to the selection of Method II were:

1. Preassignment of courses to cost centers;
2. Ease of assignment of membership hours to curriculum cost centers;
3. Simplified 20% report preparation;
4. Reduction of chance of discrepancy between Business Office cost assignment and membership hour earnback on the 20% report; and
5. Overall substantial reduction of paperwork burden on the 58 reporting institutions.

The comparisons of Methods I, II, and III with each other and with the features discussed in this chapter are highlighted in Table 5.1.

Table 5.1 Comparison of Selected Features of Methods I, II, and III

Feature	Method I	Method II	Method III
1. Direct Cost of Instructional Elements: Instructional salaries, supplies & materials, travel/ subsistence, repairs to instructional equipment, employee benefits, curriculum supervision, leased curriculum equipment	Same	Same	Same
2. Assignment of course to a specified curriculum or a "related" course program	X	X	
3. Assignment of costs based upon assignment of course to responsible curriculum program	X	X	
4. Proration of costs based upon curriculum representation in course			X Modified Proration
5. Proration of membership hours based upon curriculum program representation within course	X Exact Proration		X Modified Proration
6. Assignment of course membership hours based upon assignment of course to responsible curriculum program		X	
7. Ability to preassign cost prior to the determination of curriculum program representation in the course	X	X	
8. Rating of best method for reporting membership hours by curriculum program on 20% report	3	1	2

CHAPTER VI

Allocation of Resources

One of the desires of the CAP effort was to develop suggested methods which could be used at the local institution's option in its own budgeting process in the internal allocation of fiscal resources. In order to study this question, both the current budgetary process and the time constraints within which it must operate were examined. The findings of this examination and recommendations resulting therefrom are discussed in this chapter.

The current budgetary process at Nash Technical College consists of the following six steps:

1. In early March, the comptroller distributes to each department chairperson a form that indicates the prior year's budget in seven categories, amounts expended or encumbered to date, and other fiscal information.
2. Each department chairperson meets with his/her instructors to develop projections of enrollments and resource needs for the next fiscal year.
3. Based upon these intradepartmental meetings, the department chairpersons develop preliminary departmental budget projections for the coming year.
4. Because of the interrelated nature of most of Nash Technical College's curriculum programs and the current scarcity of funds, these budget projections are coordinated among the department chairpersons and the dean of curriculum programs; departmental budget requests are then formulated.
5. These budget requests are reviewed by a budget working group consisting of the dean of curriculum programs, the comptroller, the vice president, and the president.
6. Contingent upon final Department of Community College allocations, semifinal departmental budget requests are approved.

With the exception of the faculty, all personnel involved in the budgetary allocation process reviewed the findings of the CAP. This panel and the CAP working group conclude the following:

1. Since the budgetary process for the next fiscal year must begin in early March, and complete CAP membership data would not be available until July, such data are of limited usefulness in the resource allocation process except as historical documentation of past enrollment and curriculum cost trends.
2. Given that approximately 85% of the College's budget is allocated for faculty and staff salaries and benefits, only about 15% of the total budget can be redistributed on the basis of historical cost and enrollment trends.
3. At medium sized institutions such as Nash Technical College, faculty teaching assignments cut across curriculum programs. The individual curriculum program is too small a budgetary unit to be workable.
4. Tying resource allocations to the quasi-formula funding approach that could be implied by the CAP model reduces the institution's ability to allocate funds locally to best meet unique community needs, an explicit mission of the North Carolina Community College System.

CHAPTER VII

CAP Model

Figure 7.1 schematically illustrates the recommended model for (1) information processing and reporting, (2) evaluation of curriculum programs, and (3) fiscal resource allocation that emerged from the CAP research study. The model traces the recommended activities of three institutional staff and administrative centers: (1) the institutional information system (coordinated by the Institutional Records Office and Computer Services), (2) the Business Office, and (3) the Office of the Dean of Curriculum Programs. As can be seen from the left margin of Figure 7.1, the model includes the following phases which were discussed in the previous section: (1) the Preparation Phase, (2) the Operational Phase, (3) the Annual Budget Planning Phase, and (4) the Evaluation Phase. The steps discussed in the following subsection review some of the material covered in greater detail in Chapter III. (The reader who is interested in greater "operational" detail is referred to this chapter.)

A Step-by-Step Guide to the CAP Evaluation Model

1. The Preparation Phase

   a. The Office of the Dean of Instructional Programs assigns each course to the curriculum program that reflects the instructional intent of that course; i.e., the Office assigns each course a "program code."

   b. These program codes are assigned by Computer Services to each course on the machine readable course master file.

   c. The Business Office assigns salary, supplies, and other direct instructional costs to the appropriate cost center.

2. The Operational Phase

   During each academic term, the following activities take place:

   a. The Business Office tracks direct instructional costs for each of the curriculum program cost centers.

b. The Institutional Information System:

1. Generates machine readable course section lists;
2. Tabulates membership hours for each course; and
3. Generates 20% reports and section enrollment data for each course.

3. The Annual Budget Planning Phase

Beginning in early March, the budgetary process for the next fiscal year commences. As discussed in greater detail in Chapter VI, the following activities take place:

a. Financial information for the previous fiscal year is disseminated by the Business Office to each department chairperson.
b. Course enrollment data from previous terms are provided by Computer Services to the appropriate department chairperson.
c. Based upon enrollment data, projected community needs, and anticipated State and local budgetary constraints, the department chairpersons meet with the dean of curriculum programs to discuss enrollment projections and budgetary needs for the coming fiscal year.
d. Preliminary departmental budgets are formulated.
e. Contingent upon final Department of Community College allocations, semifinal departmental budget requests are approved.

4. The Evaluation Phase

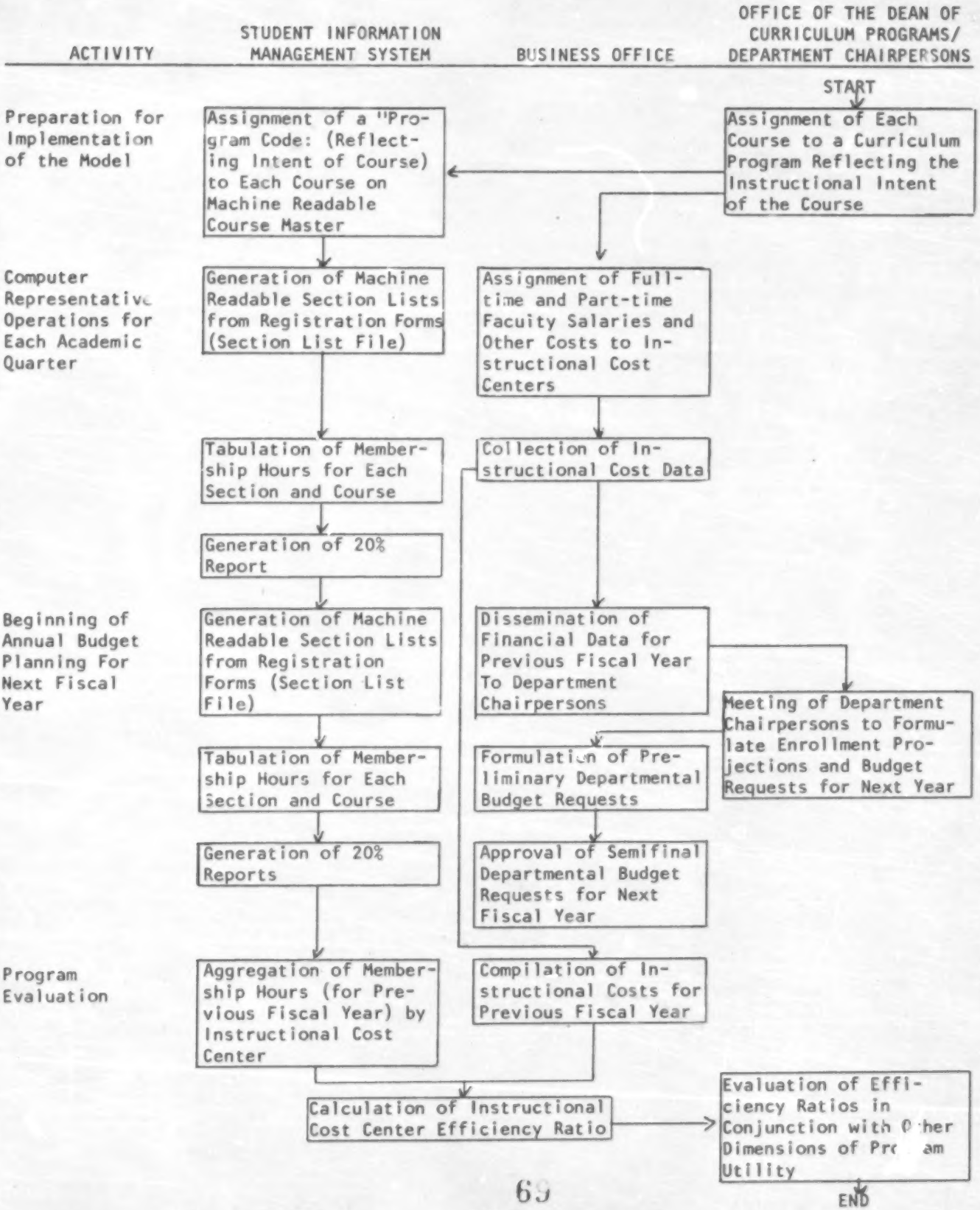
After the end of the fiscal year, June 30, the Evaluation Phase begins. First, section list data are aggregated by instructional cost centers. Second, data on direct instructional costs are compiled by the Business Office. Third, instructional cost center efficiency ratios are computed in the manner outlined in this report. Finally, an evaluation of each instructional program cost center is performed by the Office of the dean of curriculum programs. As will be suggested in the next chapter, Major

Recommendations, this review should consider not only instructional cost center efficiency ratios but, also, a host of other factors including: community need, local interest in a particular curriculum program, and the instructional capabilities of the curriculum program.

As discussed in more detail in Chapter VIII, the model recommends a coherent and integrated approach to institutional data management, analysis, and reporting in that:

1. It permits the clustering of curriculum programs into instructional cost centers that are meaningful at the institutional level.
2. It permits the preassignment of student membership hours and faculty salaries to locally meaningful instructional cost centers. Thus, it radically reduces the paperwork burden required of the 58 reporting institutions on the 20% reports and salary distribution sheets.
3. It encourages an evaluation of curriculum programs based upon many factors, including the efficient use of fiscal resources.

Figure 7.1 CAP EVALUATION MODEL


ACTIVITY
STUDENT INFORMATION MANAGEMENT SYSTEM
BUSINESS OFFICE
OFFICE OF THE DEAN OF CURRICULUM PROGRAMS/ DEPARTMENT CHAIRPERSONS
START
Preparation for Implementation of the Model
Assignment of a "Program Code: (Reflecting Intent of Course) to Each Course on Machine Readable Course Master
Assignment of Each Course to a Curriculum Program Reflecting the Instructional Intent of the Course
Computer Representative Operations for Each Academic Quarter
Generation of Machine Readable Section Lists from Registration Forms (Section List File)
Assignment of Full-time and Part-time Facuity Salaries and Other Costs to Instructional Cost Centers
Tabulation of Membership Hours for Each Section and Course
Collection of Instructional Cost Data
Generation of 20% Report
Beginning of Annual Budget Planning For Next Fiscal Year
Generation of Machine Readable Section Lists from Registration Forms (Section List File)
Dissemination of Financial Data for Previous Fiscal Year To Department Chairpersons
Meeting of Department Chairpersons to Formulate Enrollment Projections and Budget Requests for Next Year
Tabulation of Membership Hours for Each Section and Course
Formulation of Preliminary Departmental Budget Requests
Generation of 20% Reports
Approval of Semifinal Departmental Budget Requests for Next Fiscal Year
Program Evaluation
Aggregation of Membership Hours (for Previous Fiscal Year) by Instructional Cost Center
Compilation of Instructional Costs for Previous Fiscal Year
Calculation of Instructional Cost Center Efficiency Ratio
Evaluation of Efficiency Ratios in Conjunction with Other Dimensions of Program Utility
END

CHAPTER VIII

Major Recommendations

The Cost Analysis Project concludes its report with four major recommendations formulated on the basis of the study's findings. These recommendations and their rationale are presented in this chapter.

Recommendation 1: The CAP Method II should be substituted for the current State cost analysis method (Method III).

Rationale

Membership hours calculated under Method I (the method more closely resembling the State's "Method III") and Method II were highly correlated ($r = .984$). In addition, the cost per membership hour yielded by Methods I and II were also highly correlated ($r = .90$). These findings suggest a close correspondence between the results yielded by the two costing methods. Given this high degree of relationship, Method II is the logical operational choice in that it would be much easier to implement at the 58 reporting community college system institutions.

Recommendation 2: The membership hours reported on the 20% report should be used as the source for calculating membership hour earnback.

Rationale

This will insure consistency between the 20% report data and cost accounting data.

Recommendation 3: The cost analysis system used should be flexible enough to permit the "clustering" of two or more curriculum programs into a single cost center at the discretion of the individual institution.

Rationale

In the NTC cost analysis model, programs were clustered into cost center. (See Table 3.1) For example, six business curriculum programs were combined into a single cost center - Business Options. The reasons for clustering these business programs were:

a. Four of the six curriculum programs had relatively low headcounts and FTE earnings.

b. A large number of the courses revolved around the Business Administration curriculum core.

c. Many of the full-time faculty in the business area taught in most of the six curriculum programs, and the prorating of their salaries was not considered cost effective in terms of the comptroller's time.

This clustering of several similar curriculum programs into common cost centers frees valuable memory space on the accounting computer and simplifies data reporting throughout the institution.

Recommendation 4: Evaluation of curriculum programs by each institution should be based on several criteria.

Rationale

These criteria should include: the curriculum program's efficiency ratio, community need, student need, industrial need, and enrollment projections. As discussed in Chapter VI, the CAP data would not be available in time for local institutions to use in resource allocation (during March) for the next fiscal year. It would, however, provide useful historical information on the utilization of fiscal resources.

Appendix A

BIBLIOGRAPHY

1. "Cost Analysis: First Step Toward Differentiated Funding"
Bob N. Cage and Harmon R. Fowler
National Educational Finance Project
Gainsville, Florida, January, 1971
ED 048 863

2. "Discipline Cost Analysis Manual"
Maryland Community Colleges
Annapolis, Maryland, February, 1981
ED 192 836

3. "Unit Expenditures Study, 1976-1977"
Norman M. Fisher
Washington State Council for Post Secondary Education
Report No. 80-7
Olympia, Washington
ED 188 536

4. "Unit Cost Analysis for the Public Community College of Illinois"
FY 1979
Illinois Community College Board
Springfield, Illinois, January, 1980
ED 187 36

5. "Planning: Two Year Colleges"
Ohio Board of Regents
Management Improvement Program
Columbus, Ohio, 1 July 1973
ED 107 330

Appendix B

RELATED READINGS

"Coping With Reduced Resources. New Directions For Community Colleges, No. 22"
Alfred, Richard L.
California University, Los Angeles
Eric Clearing House for Junior Colleges, Inf. 78 112 p.
ED 154 888

"Muskegon Community College Long Range Plan"
Turner, Peter M. and Others
Muskegon Community College, Michigan, June, 1980
ED 203 952

"Postsecondary Occupational Education Needs Study For The Lower Eastern Shore: A Proposal"
Maner, Arnold H.
Maryland State Board for Community Colleges, Annapolis, February, 1975
ED 108 715

"An Analysis of the Factors Which Affect Instructional Unit Cost in the Public Community Colleges of Illinois"
Wallhaus, Penny and Lach, Ivan J.
Illinois Community College Board, Springfield, January, 1981
ED 198 848

"Unit Cost Analysis in Public Community Colleges of Illinois, 1977-1978" (FY 1978) Volume VII
Bielen, Alan V. and Others
Illinois Community College Board, Springfield, May, 1979
ED 190 165

"A Curricular and Financial Cost Analysis of the Independent Two Year College of America"
Meeth, L. Richard
National Council of Independent Colleges, 1974
ED 097 056

"PPBS: Its Impact Upon Curriculum Decisions"
Toler, Thomas M.
ED 136 897

"Reality-Based Evaluation For Two-Year College Occupational Program Guidebook" Research Pub. 76-3
Winter, Gene M.
State University of New York, Ithaca, September 1976
ED 130 685

Appendix C

DIRECT COST OF INSTRUCTION

Worksheet for _____

Program

1.	Instructional Salaries	$ _____
2.	Supplies and Materials	$ _____
3.	Travel/Subsistence	$ _____
4.	Repairs of Instructional Equipment	$ _____
5.	Employee Benefits	$ _____
6.	Curriculum Supervision	$ _____
7.	Leased Curriculum Equipment	$ _____
	Total Direct Instructional Cost	$ _____

. Equipment $ _____

Purpose: Used by the Business Office to transmit financial data at the end of the year to Computer Services